

CLAIMS

We claim:

1. An absorbing composition comprising at least one inorganic-based compound, at least one absorbing compound, and at least one material modification agent.
- 5 2. The absorbing composition of claim 1, wherein the at least one material modification agent comprises at least one adhesion promoter, at least one crosslinking agent, at least one porogen, at least one high-boiling solvent, at least one catalyst, at least one capping agent, at least one pH tuning agent or a combination thereof.
3. The composition of claim 1, wherein the absorbing compound is an organic-based
10 compound.
4. The composition of claim 1, wherein the absorbing compound strongly absorbs light over at least an approximately 0.5 nm wide wavelength range at wavelengths less than 375 nm.
5. The composition of claim 1, wherein the absorbing compound strongly absorbs light over at least an approximately 10 nm wide wavelength range at wavelengths less than 375 nm.
- 15 6. The composition of claim 4, wherein the range comprises wavelengths less than about 260 nm.
7. The composition of claim 1, wherein the absorbing compound comprises at least one benzene ring and a reactive group selected from the group comprising hydroxyl groups, amine groups, carboxylic acid groups and substituted silyl groups.
- 20 8. The composition of claim 7, wherein the absorbing compound comprises two or more benzene rings.
9. The composition of claim 8, wherein the two or more benzene rings are fused.
10. The composition of claim 7, wherein the organic absorbing compound comprises an absorbing compound comprising anthraflavic acid, 9-anthracene carboxylic acid,
25 9-anthracene methanol, alizarin, quinizarin, primuline,

2-hydroxy-4(3-triethoxysilylpropoxy)-diphenylketone, rosolic acid, triethoxysilylpropyl-
1,8-naphthalimide, 9-anthracene carboxy-alkyl triethoxysilane, phenyltriethoxysilane,
10-phenanthrene carboxy-methyl triethoxysilane, 4-phenylazophenol, 4-
ethoxyphenylazobenzene-4-carboxy-methyl triethoxysilane, 4-
5 methoxyphenylazobenzene-4-carboxy-methyl triethoxysilane or mixtures thereof.

11. The composition of claim 1, wherein the inorganic-based compound comprises a silicon-based compound.

12. The composition of claim 11, wherein the silicon-based compound comprises a polymer.

10 13. The composition of claim 12, wherein the polymer comprises an organosiloxane compound, such as methylsiloxane, methylsilsesquioxane, phenylsiloxane, phenylsilsesquioxane, acrylic siloxane polymers, methylphenylsiloxane, methylphenylsilsesquioxane, silicate polymers, silazane polymers or mixtures thereof.

14. The composition of claim 12, wherein the polymer comprises hydrogensiloxane,
15 hydrogensilsesquioxane, organohydridosiloxane, silsesquioxane-based compounds, derivatives of silici acid and organohydridosilsesquioxane polymers; copolymers of hydrogensilsesquioxane and an alkoxyhydridosiloxane, hydroxyhydridosiloxane, derivatives of silici acid or mixtures thereof.

15. The composition of claim 12, wherein the polymer is of a general formula comprising
20 $(H_{0-1.0}SiO_{1.5-2.0})_x$, where x is greater than about 4, and $(H_{0-1.0}SiO_{1.5-2.0})_n(R_{0-1.0}SiO_{1.5-2.0})_m$, where m is greater than 0, the sum of n and m is from about 4 to about 5000 and R is a C_1 - C_{20} alkyl group or a C_6 - C_{12} aryl group.

16. The composition of claim 2, wherein the at least one adhesion promoter comprises a base.

17. The composition of claim 2, wherein the at least one adhesion promoter comprises
25 nitrogen.

18. The composition of claim 2, wherein the at least one adhesion promoter comprises phosphorus.
19. The composition of one of claims 16 or 17, wherein the at least one adhesion promoter comprises an amine base.
- 5 20. The composition of claim 19, wherein the at least one adhesion promoter comprises ammonium, pyridine, aniline, TMAH, CTAH, TBAH, APTEOS or a combination thereof.
21. The composition of claim 17, wherein the at least one adhesion promoter comprises at least one amine salt.
- 10 22. The composition of claim 21, wherein the at least one amine salt comprises a weak acid/weak base, a weak acid/strong base or a strong acid/strong base.
23. The composition of claim 22, wherein the at least one adhesion promoter comprises TMAA, TMAN or a combination thereof.
24. The composition of claim 22, wherein the at least one amine salt comprises a strong
15 acid/weak base.
25. The composition of claim 21, wherein the at least one adhesion promoter comprises APTEOS triflate, APTEOS methanesulfonate, APTEOS nitrate, APTEOS nfbs, ammonium triflate, ammonium nfbs, ammonium methanesulfonate, ammonium nitrate, TMAH triflate, TMAH nfbs, TMAH methanesulfonate, TMAH nitrate or a combination
20 thereof.
26. The composition of claim 2, wherein the at least one adhesion promoter comprises an acid.
27. The composition of claim 2, the at least one adhesion promoter comprises a neutral compound.
- 25 28. The composition of claim 2, wherein the at least one catalyst comprises a weak acid.

29. The composition of claim 2, wherein the at least one adhesion promoter comprises a resin-based material.
30. The composition of claim 29, wherein the resin-based material comprises at least one of a phenolic-containing resin, a novolac resin, an organic acrylate resin or a styrene resin.
- 5 31. The composition of claim 2, wherein the adhesion promoter comprises a polydimethylsiloxane-based material, an alkoxy or hydroxy-containing silane monomer, a vinyl-containing silane monomer, an acrylated silane monomer or a silyl hydride compound.
- 10 32. The composition of claim 2, wherein the at least one capping agent comprises a terminating monomer.
33. The composition of claim 32, wherein the terminating monomer comprises a silane compound.
34. The composition of claim 2, wherein the at least one porogen comprises an organic compound.
- 15 35. The composition of claim 34, wherein the organic compound comprises a polymer.
36. The composition of claim 35, wherein the polymer comprises poly(ethylene oxide).
37. The composition of claim 2, wherein the at least one porogen further comprises a catalyst.
38. The composition of claim 37, wherein the catalyst comprises an amine salt.
39. The composition of claim 38, wherein the amine salt comprises a salt of a weak
20 acid/weak base or a weak acid/strong base.
40. The composition of claim 37, wherein the catalyst comprises TMAA, TMAN, TBAA, TBAN, CTAA, CTAN or a combination thereof.
41. A coating solution comprising the composition of one of claim 1 or claim 2 and an additional solvent or a solvent mixture.

42. The coating solution of claim 41, wherein the solution is between about 0.5% and about 20% by weight absorbing material.

43. A method of making an absorbing composition comprising:

combining at least one inorganic-based compound, at least one absorbing compound, at least one material modification agent, an acid/water mixture, and one or more solvents to form a reaction mixture; and

allowing the reaction mixture to form the absorbing composition at room temperature.

44. The method of claim 43, wherein the at least one material modification agent comprises at least one adhesion promoter, at least one crosslinking agent, at least one porogen, at least one high-boiling solvent, at least one catalyst, at least one capping agent, at least one pH tuning agent or a combination thereof.

45. A method of making an absorbing composition comprising:

combining at least one inorganic-based compound, at least one absorbing compound, at least one material modification agent, an acid/water mixture, and one or more solvents to form a reaction mixture; and

heating the reaction mixture to form the absorbing composition.

46. The method of claim 45, wherein the at least one material modification agent comprises at least one adhesion promoter, at least one crosslinking agent, at least one porogen, at least one high-boiling solvent, at least one catalyst, at least one capping agent, at least one pH tuning agent or a combination thereof.

47. A method of making an absorbing composition comprising:

combining at least one inorganic-based compound, at least one absorbing compound, at least one material modification agent, and one or more solvents to form a reaction mixture, wherein the at least one material modification agent comprises at least one acid and water; and

heating the reaction mixture to form an absorbing material, a coating or a film.

48. The method of claim 47, wherein the at least one material modification agent comprises at least one adhesion promoter, at least one crosslinking agent, at least one porogen, at least one high-boiling solvent, at least one catalyst, at least one capping agent, at least one pH tuning agent or a combination thereof.
- 5 49. A method of making an absorbing composition comprising:

combining at least one inorganic-based compound, at least one absorbing compound, at least one material modification agent, and one or more solvents to form a reaction mixture, wherein the at least one material modification agent comprises at least one acid and water; and

10 allowing the reaction mixture to form an absorbing material, a coating or a film.
50. The method of claim 49, wherein the at least one material modification agent comprises at least one adhesion promoter, at least one crosslinking agent, at least one porogen, at least one high-boiling solvent, at least one catalyst, at least one capping agent, at least one pH tuning agent or a combination thereof.
- 15 51. A layered material comprising the absorbing composition of one of claims 1 or 2 coupled to a resist material.
52. A semiconductor component comprising the absorbing composition of one of claims 1 or 2.
53. A film comprising the absorbing composition of either of claims 1 or 2.
- 20 54. An electronic component comprising the absorbing composition of either of claims 1 or 2.
55. The composition of one of claims 1 or 2, wherein the absorbing composition is designed to be at least partially removed.
56. The composition of claim 51, wherein the resist material absorbs light over a wavelength
25 range that comprises 157 nm, 193 nm, 248 nm and 365 nm.